



INFORMATION REPORT

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	November 18, 2019
SUBJECT/REPORT NO:	Feasibility of Public Side Lead Water Service Line Replacement (PW19094) (City Wide) (Outstanding Business List Item)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Ryan Doyle (905) 546-2424 Ext. 2757
SUBMITTED BY:	Andrew Grice Director, Hamilton Water Public Works Department
SIGNATURE:	

COUNCIL DIRECTION

On April 18, 2019 the Audit Finance and Administration Committee directed staff to report back to the Public Works Committee regarding the feasibility of replacing all known public lead service lines.

INFORMATION

To provide Council with the information required to assess the feasibility of replacing all public lead service lines this report reviews the following topics:

- Health impacts associated with lead service replacement
- Efficacy of orthophosphate program regarding reduction of lead precipitate
- Budget and resource impacts
- Additional public works programs (i.e. watermain replacement program and road replacement program)

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OUR Mission: To provide high quality cost conscious public services that contribute to a healthy, safe and prosperous community, in a sustainable manner.

OUR Culture: Collective Ownership, Steadfast Integrity, Courageous Change, Sensational Service, Engaged Empowered Employees.

Health Risks

The Ministry of the Environment, Conservation and Parks (MECP) guidelines indicate that the process in which the lead service is replaced may have direct influence over the concentration of lead migrating into drink water. A partial replacement of a lead service line (e.g. only the private side or public side of service replaced) has the potential to increase lead concentrations via the following mechanisms:

- Construction activities can dislodge lead particles that can enter the drinking water
- Connecting a lead service line to a new copper line may result in an electrochemical process between the two metals that can dissolve lead particles into the drinking water

This indicates that if the public portion of the lead service is replaced prior to the private portion or vice versa, that lead exposure to the residents can increase. As a result, drinking water should be filtered prior to consumption or use for cooking until the remaining portion of the lead service is replaced. The City's current practice is to issue Brita filters for lead filtering when a private lead service line is replaced as part of the City substandard water service program until such time that the public portion of the lead service is replaced.

By replacing public lead service lines ahead of the private portion of a lead service line, there is no guarantee property owners will replace the private portion of the lead service. If the property owner chooses not to replace the private portion of the lead service, they may be subject to long-term health risks associated with dissolved lead in their drinking water. Furthermore, should property owners not replace the private portion of their lead water service, the expenditure on public service replacements is an inefficient use of resources.

Efficacy of Orthophosphate Program

At the November 25, 2015 Council Meeting, Report 15-015, the Corrosion Control Program (CCP) for the Woodward Drinking Water Subsystem (DWSS) was approved for lead control in drinking water. On November 8, 2018 the phosphate-based CCP commenced and the post implementation sampling and monitoring is underway.

Lead levels are monitored through the legislated Schedule 15.1 community lead sampling program. Since implementation of the CCP, two completed rounds of community lead sampling have occurred. The sampling rounds have consisted of 50 residential, five (5) nonresidential, and 10 distribution system samples within the Woodward DWSS. The results shown in Appendix A to report PW19094, illustrate a reduction in the range of lead values observed at the tap as well as an overall

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decreasing trend in the percentage of samples observed to be above the Maximum Acceptable Concentration (MAC) of 10 µg/L, when compared with the sampling rounds from 2008 to 2009, that preceded the implementation of the CCP.

Additionally, three lead pipe loops were installed in the Woodward Avenue DWSS at strategic locations (within Hamilton Water facilities) as an additional tool to monitor the effectiveness of the CCP. Lead concentrations measured at the three lead pipe loops have exhibited a decreasing trend in lead concentrations. During the latest sampling period from November of 2018 – July of 2019, lead concentrations have not exceed the MAC at either of the three pipe loops. This demonstrates the effectiveness of the orthophosphate program.

The City has not received any water quality complaints related to the CCP since the program initiated in November 2018.

Based on comparisons with other water utilities that have implemented a phosphate-based treatment approach and the size of the Woodward DWSS, it is estimated that it will take at least two years to see the full effects of the CCP. The City of Toronto initiated their orthophosphate based CCP in 2014 and almost all lead sampling results from 2018 are below the MAC of 10 µg/L. Despite the infancy of the City of Hamilton CCP the initial results show a promising reduction in the levels of lead and other metals at the tap.

It should be noted that Health Canada has revised the guidelines for Canadian Drinking Water Quality with a new MAC for lead of 5 µg/L. At the time of this report, the MECP has not determined whether the Provincial MAC will remain at 10 µg/L or will be lowered to 5 µg/L.

Budget and Resource Impacts

Currently, lead services are replaced through the substandard water service program as well as coordinated with capital work within the road allowance.

The substandard water service program is a citizen driven initiative. Property owners are required to replace the private portion of the lead service prior the City replacing the public portion of the lead service. The City does not know the exact location of the estimated 20,000 lead services that are expected to exist within the Woodward DWSS. To accelerate the lead water service replacements, investigations would be required to identify any remaining lead services in the water distribution system. Budget and resource impacts associated with an accelerated replacement program are highlighted in Table 1.

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Lead services are also replaced in conjunction with capital watermain and road work. Since 2011, an average of 119 services are replaced annually as part of the watermain replacement program.

It will take approximately 25 years totalling \$103M at \$4.12M per year to replace the public portion of all known lead services at the current replacement rates. Below, Table 1 highlights the costs associated with accelerating public portion lead service replacements. Cost were derived from 2018 information, and do not account for greater than 20,000 lead services. Further detailed cost development will be required prior to implementation of any of these options.

Table 1 - Estimated costing models of lead service replacement program

Capital Cost for Lead Service Replacement Program Duration (years)	Total Additional Staff	Lead Services Replacement	Annual Cost (\$/yr)
10	10	\$118,503,000	\$13,020,750
15	7	\$114,754,500	\$8,663,090
20	5	\$111,006,000	\$6,321,900
25 (Current Program)	0	\$103,001,250	\$4,120,050

As many as 10 additional staff (operators, inspectors, support staff) are required to deliver an accelerated public side lead service replacement program. Furthermore, the capital expenses vary by program duration due to the public lead service line replacements completed as part of the watermain replacement program.

Additional Public Works Programs

Watermain Rehabilitation/Replacement Program (cast-iron):

The Engineering Service Division in Public Works has reviewed the cathodic protection associated with lead services. Cathodic protection when utilized on a watermain is the process of connecting a sacrificial material that will draw corrosion potential away from a watermain and towards the sacrificial material. Cathodic protection is important when removing lead services at an accelerated rate as lead acts as cathodic protection for cast-iron and will expedite the rate of degradation of cast-iron watermain which represents 17% (320km) of the watermain inventory.

To mitigate the accelerated degradation of cast-iron watermains, cathodic protection would be required where every lead service was removed. Staff are conducting further

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analysis on cathodic protection, but the overall cost may be upwards of an additional \$3M.

Coordinated Roads Program:

Currently, replacement or rehabilitation of water and wastewater infrastructure is coordinated as closely as possible with the reconstruction of roads. To meet program timelines of an accelerated lead service replacement program, such work would have to be scheduled independently from roads replacement/rehabilitation programs. In doing so, road cuts would become prevalent and the lifespan of affected City roads would be diminished. This scenario could warrant increases to the levy budget so as not to postpone much needed road replacement and rehabilitation programs that are effectively driving the rehabilitation and replacement of aged water and wastewater infrastructure. Other factors such as negative optics surrounding large increases in road cuts could provide unnecessary attention.

A detailed review and cost development would be required to quantify the impacts of a dedicated public lead service replacement program regarding its interaction with existing Public Works roads programs.

Conclusion

If Council wants to pursue an accelerated public side lead service replacement program, significant costs would be required regardless of the desired program duration. Preliminary costs and resource estimates for only the replacement of public portions of lead services range from \$4.12M to \$13.02M per year for program durations of approximately 25 to 10 years, with requirements for up to 10 additional staff.

Council should also consider the results of the orthophosphate based CCP and the potential health risks associated with partial service replacement when evaluating the need for an accelerated public lead service replacement program.

APPENDICES AND SCHEDULES ATTACHED

Appendix "A" – Percent of Sample Points with Lead above MAC